

Appl. No. 10/660,306
Amdt Dated Dec. 15, 2005
Reply to Office Action November 15, 2005

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (original): An apparatus for making a cooling device, the cooling device comprising a heat sink and a heat pipe integrally formed with the heat sink, the heat sink comprising a base and a plurality of fins, the apparatus comprising:

a mold, comprising a base part and a pair of symmetrical forming parts slidably engaged on the base part, each of the forming parts defining a plurality of slots corresponding to the fins of the heat sink, a cavity at endmost portions of the slots corresponding to the base of the heat sink, and a recess in communication with the cavity corresponding to the heat pipe, wherein one portion of the recess extends transversely the slots; and

a core accommodated in the recess of the forming parts.

Claim 2 (original): The apparatus as claimed in claim 1, wherein each of the forming parts further defines a chamber adjacent the slots, and the chamber is in communication with ends of the recess.

Claim 3 (original): The apparatus as claimed in claim 2, wherein each of the forming parts further defines a sprue and a conduit connecting between the sprue and the cavity, the sprue being for feeding molten material into the mold, the

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conduit being for conveying molten material from the sprue to the cavity.

Claim 4 (original): The apparatus as claimed in claim 3, wherein each of the forming parts further defines a well above and in communication with the slots, for air venting when the mold is filled with molten material and for providing surplus molten material needed when molten material in the slots solidifies and shrinks during a molding process.

Claim 5 (original): The apparatus as claimed in claim 1, wherein the base part defines a pair of grooves in a top face thereof, and each of the forming parts comprises a pair of slide blocks slidably engaged in the grooves.

Claim 6 (currently amended): The apparatus as claimed in claim 2, wherein the core ~~comprise~~ comprises a generally U-shaped main body and a peripheral portion integrally adjoining ends of the main body, the main body is accommodated in the recesses of the forming parts, and the peripheral portion is accommodated in the chambers of the forming parts.

Claim 7 (original): The apparatus as claimed in claim 6, wherein the core is made of water-soluble material.

Claim 8 (original): The apparatus as claimed in claim 6, wherein the core is made of sand.

Claim 9 (original): The apparatus as claimed in claim 6, wherein the core is

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made of metal pipe.

Claim 10 (original): A method for making a cooling device, the cooling device comprising a heat sink and a heat pipe integrally formed with the heat sink, the heat sink comprising a base and a plurality of fins, the method comprising the steps of:

- a) providing a mold for making the cooling device, the mold comprising a base part and a pair of forming parts slidably engaged on the base part, the forming parts defining a void therebetween corresponding to a configuration of the cooling device;
- b) providing a core corresponding to the heat pipe of the cooling device, the core comprising a main body and a peripheral portion adjoining ends of the main body;
- c) attaching the core to one of the forming parts;
- d) closing the mold, with the two forming parts being slidably moved toward each other;
- e) feeding molten material into the mold;
- f) allowing the molten material to cool;
- g) opening the mold, with the two forming parts being slidably moved apart, and taking out a preform of the cooling device from the mold;
- h) removing the core;
- i) removing by-products formed as part of the preform;
- j) sealing one end of the heat pipe being part to the preform;
- k) filling working liquid into the heat pipe via the unsealed end thereof;

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and

- l) sealing the unsealed end of the heat pipe.

Claim 11 (original): The method as claimed in claim 10, further comprising the step of filling capillary material into the heat pipe via the other unsealed end thereof before step k).

Claim 12 (original): The method as claimed in claim 10, further comprising the step of evacuating air from the heat pipe before step l).

Claim 13 (original): The method as claimed in claim 10, wherein the core is made of water-soluble material, and step h) comprises soaking the preform in water to dissolve the core and thereby provide the heat pipe.

Claim 14 (original): The method as claimed in claim 10, wherein the core is made of sand, and step h) comprises scouring the core with high-pressure water to break the core into pieces and wash the sand away and thereby provide the heat pipe.

Claim 15 (original): The method as claimed in claim 10, wherein the core is made of metal pipe, and step h) comprises cutting the peripheral portion away from the preform and thereby provide the heat pipe.

Claim 16 (withdrawn): A unitary cooling device for heat-dissipation for a

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heat-generating component, the cooling device comprising:

a heat sink adapted for attaching to the component, the heat sink comprising a base and a plurality of fins extending integrally from the base; and

at least a heat pipe integrally formed with the heat sink via a molding process, the heat pipe filled with working liquid, a portion of the heat pipe integrally connected to the base, other portions of the heat pipe integrally connected to and extending through the fins via said molding process so that said heat pipe is essentially not a discrete part relative to the base and the fins and requires no further mechanical securement between the heat pipe and either the base or the fins;

wherein when the base absorbs heat from the component, the heat is transferred to the fins not only directly via joint between the fins and the base but also indirectly by the heat pipe by way of flow of the working liquid.

Claim 17 (withdrawn): The cooling device as claimed in claim 16, wherein the heat pipe defines at least a lying U-shaped configuration, and said portion of the heat sink refers to a lower arm of said U-shaped configuration under a condition that at least a lower half of said portion of the heat pipe is integrally connected to the base and extends along a direction on a plane defined by said base.

Claim 18 (withdrawn): The cooling device as claimed in claim 16, wherein the lower half of said portion of the heat pipe is essentially embedded in the base.